WHAT IS CLAIMED IS:

1. A fuel supply apparatus for providing a continuous supply of a hydrogen-rich reformate, the fuel supply apparatus comprising:

a reforming reactor comprising a catalyst bed for converting a hydrocarbon fuel to a reformate, the catalyst bed comprising a reforming catalyst and a carbon dioxide fixing material;

a hydrogen storage device in fluid communication with the reforming reactor for storing a portion of the reformate;

a reformate outlet in fluid communication with the hydrogen storage device; and

a controller in communication with the reforming reactor and the hydrogen storage device for controlling the delivery of reformate to the reformate outlet.

2. The apparatus of claim 1, wherein the reforming reactor comprises a single catalyst bed.

3. The apparatus of claim 1, wherein the catalyst bed further comprises a water gas shift catalyst.

4. The apparatus of claim 1, wherein the reforming catalyst and the carbon dioxide fixing material have a non-uniform distribution within the catalyst bed.

5. The apparatus of claim 1, further comprising heat generating means operably connected to the reactor for heating the catalyst bed to a calcination temperature.

6. The apparatus of claim 1, further comprising a polishing unit disposed downstream from the catalyst bed for removing one or more impurities from the hydrogen-rich reformate, the polishing unit selected from the group consisting of drying units, methanation reactors, selective oxidation reactors, pressure

swing absorption units, temperature swing absorption units, membrane separators and combinations of the same.

7. The apparatus of claim 1, wherein the hydrogen storage device comprises a compressor and high pressure storage vessel in communication with the compressor.

8. The apparatus of claim 1, wherein the hydrogen storage device comprises a storage vessel and a hydrogen fixing material disposed within the storage vessel.

9. The apparatus of claim 8, wherein the hydrogen fixing material comprises a material selected from the group consisting of activated carbon, carbon composites, fullerene based materials, metal hydrides, alloys comprising titanium, vanadium, chromium and manganese, and nanostructures formed from elements of the second and/or third rows of the periodic table.

10. The apparatus of claim 1, wherein the hydrogen storage device comprises a liquefaction unit for converting the hydrogen-rich reformate to a liquefied reformate and a storage vessel in communication with the liquefaction unit for storing the liquefied reformate.

11. The apparatus of claim 1, wherein the controller controls the operation reforming reactor and/or the hydrogen storage device.

12. The apparatus of claim 11, wherein the controller controls the delivery of reformate to the reformate at a selected rate.

13. The apparatus of claim 1, wherein the reforming reactor is operable in a non-reforming mode.

14. The apparatus of claim 13, wherein the hydrogen storage device has a storage capacity sufficient for delivering reformate to the reformate outlet at the selected rate when the reforming reactor is operated in the non-reforming mode.

15. The apparatus of claim 13, wherein the non-reforming mode comprises one or more operations selected from the group consisting of cooling the catalyst bed to a reforming temperature, heating the catalyst bed to a reforming temperature, heating the catalyst bed to a calcination temperature, hydrating the catalyst bed with steam, adjusting a flow of hydrocarbon fuel to the catalyst bed and adjusting a flow of steam to the catalyst bed.

16. The apparatus of claim 1, further comprising a hydrogen-consuming device in fluid communication with the reformate outlet, the hydrogen-consuming device disposed downstream of the reformate outlet.

17. The apparatus of claim 16, wherein the controller communicates with the hydrogen-consuming device.

18. The apparatus of claim 1, further comprising a manifold in fluid communication with each of the reforming reactor, the hydrogen storage device and the reformate outlet, the manifold disposed downstream of the reforming reactor for directing reformate to the hydrogen storage device and/or the reformate outlet.

19. The apparatus of claim 18, wherein the controller controls the operation of the manifold.

20. A method for providing a continuous supply of hydrogen-rich reformate for use in a hydrogen-consuming device or process, the method comprising the steps of:

reforming a hydrocarbon fuel within a catalyst bed comprising a reforming catalyst and a carbon dioxide fixing material to produce a reformate product comprising hydrogen and carbon dioxide, the carbon dioxide

fixing material fixing at least a portion of the carbon dioxide to produce a hydrogen-rich reformate;

storing at least a portion of the hydrogen-rich reformate in a hydrogen storage device to provide a stored reformate; and

controlling the hydrogen-rich reformate and stored reformate delivered to a reformate outlet.

21. The method of claim 20, further comprising the step of heating the catalyst bed to a calcination temperature prior to reforming the hydrocarbon fuel.

22. The method of claim 21, wherein the heated catalyst bed is allowed to cool to a reforming temperature prior to reforming the hydrocarbon fuel.

23. The method of claim 21, wherein the heated catalyst bed is hydrated with steam prior to reforming the hydrocarbon fuel.

24. The method of claim 20, further comprising the step of heating the catalyst bed to a reforming temperature prior to reforming the hydrocarbon fuel.

25. The method of claim 20, further comprising the step of polishing the reformate product to remove one or more impurities, the polishing step selected from the group consisting of water removal, methanation, selective oxidation, pressure swing adsorption, temperature swing adsorption, membrane separation and combinations of the same.

26. The method of claim 20, further comprising the step of interrupting the reforming of the hydrocarbon fuel in the catalyst bed.

27. The method of claim 26, wherein the reforming of the hydrocarbon fuel is interrupted by reducing a flow of hydrocarbon fuel to the catalyst bed.

28. The method of claim 26, further comprising the step of heating the catalyst bed to a calcination temperature to release fixed carbon dioxide and form carbon dioxide-laden gas.

29. The method of claim 28, further comprising the step of directing the carbon dioxide-laden gas out of the catalyst bed.

30. The method of claim 29, further comprising the steps of
allowing the catalyst bed to cool to a reforming temperature; and
resuming the reforming of the hydrocarbon fuel.

31. The method of claim 29, further comprising the steps of
hydrating the catalyst bed with steam; and
resuming the reforming of the hydrocarbon fuel.

32. The method of claim 31, further comprising the step of heating the catalyst bed to a reforming temperature prior to resuming the reforming of the hydrocarbon fuel.

33. The method of claim 20, further comprising the step of selecting a rate at which hydrogen-rich reformate and/or stored reformate is to be delivered to the reformate outlet.

34. The method of claim 33, wherein the rate at which hydrogen-rich reformate and/or stored reformate is to be delivered to the reformate outlet is selected at least in part on a reformate requirement of a hydrogen-consuming device in fluid communication with the reformate outlet.

35. The method of claim 20, wherein stored reformate is delivered to the reformate outlet when the catalyst bed is operated in a non-reforming mode.

36. The method of claim 20, wherein the hydrogen-rich reformate and stored reformate are controlled to be delivered to the reformate outlet at a desired rate.

37. The method of claim 36, wherein stored reformate is delivered to the reformate outlet when the catalyst bed produces reformate product at rate less than the desired rate.